



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/536,347	03/27/2000	Andrew D. Bailey III	LAM1P126/P0562	3591

22434 7590 08/27/2004

BEYER WEAVER & THOMAS LLP
P.O. BOX 778
BERKELEY, CA 94704-0778

EXAMINER

ALEJANDRO MULERO, LUZ L

ART UNIT	PAPER NUMBER
----------	--------------

1763

DATE MAILED: 08/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

12

Office Action Summary	Application No. 09/536,347	Applicant(s) BAILEY, ANDREW D.	
	Examiner Luz L. Alejandro	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2, 5-7, 9-15 and 27-32 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2, 5-7, 9-15, 27-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 27-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims depend on cancelled claim 26. For purposes of examination the claims will be considered to be depending on claim 2. Correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 5-7, 12, 27-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dandl, U.S. Patent 5,370,765 in view of Moslehi et al., U.S. Patent 5,464,499, or Sekine et al., U.S. Patent 5,444,207, or Hershkowitz et al., U.S. Patent 5,032,205.

Dandl shows the invention substantially as claimed including a plasma processing apparatus 10' for processing a substrate 103 comprising: a process

Art Unit: 1763

chamber comprising: a wall defining part of the process chamber; a device 101 for igniting and sustaining within the process chamber a plasma for said processing; and a plasma confinement arrangement, comprising a magnetic array (105, for example) having a plurality of permanent magnetic elements that are disposed within said process chamber, said plurality of magnetic elements being configured to produce a magnetic field, and wherein said plurality of magnetic elements are within said plasma region, wherein the wall surrounds the magnetic elements and the plasma region so that plasma is able to form plasma deposition on the wall, and wherein the magnetic field produced by the magnetic elements reduces plasma deposition on the wall (see fig. 4A and its description, including col. 13-line 65 to col. 14-line 12).

Dandl is applied as above but fails to expressly disclose wherein each of said plurality of magnetic elements extend substantially from a first end of said process chamber to a chuck. Moslehi et al. discloses an apparatus which comprises a plurality of permanent magnets 72 extending from a first end of said process chamber to a chuck to induce magnetron enhancement within the processing chamber (see, for example, fig. 1). Also, Sekine et al. discloses an apparatus which comprises a plurality of permanent magnets 13 extending from a first end of said process chamber to a chuck for generating a magnetic field within the processing chamber (see, for example, fig. 1, 5a, 5b, and 18). Additionally, Hershkowitz et al. discloses an apparatus which comprises a plurality of permanent magnets extending from a first end of said process chamber to a chuck for generating a magnetic field within the processing

Art Unit: 1763

chamber (see, for example, fig. 3 and its description). Therefore, in view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Dandl so as to dispose the plurality of magnetic elements extending substantially from a first end of the process chamber to a chuck because this is an alternative way to generate the magnetic field and enhance the plasma in the processing chamber.

With respect to claims 5-6, note that the permanent magnets of the apparatus of Dandl modified by Moslehi et al. or Sekine et al. or Hershkowitz et al. have physical axis which extends along the plasma region and have magnetic axis which are substantially perpendicular to the physical axis.

Regarding claims 30 and 32, note that the chamber of the apparatus of Dandl is cylindrical (see, for example, col. 7-lines 62-65) and further comprises a dielectric window at the top of the substantially cylindrical shape.

Claims 9 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dandl, U.S. Patent 5,370,765 in view of Moslehi et al., U.S. Patent 5,464,499, or Sekine et al., U.S. Patent 5,444,207, or Hershkowitz et al., U.S. Patent 5,032,205 as applied to claims 2, 4-7, 12, 26-32 above, and further in view of Taira et al., U.S. Patent 6,153,977.

Dandl, Moslehi et al., Sekine et al., and Hershkowitz et al. are applied as above but fail to expressly disclose wherein said magnetic elements are individually contained in sleeves. Taira et al. discloses a permanent magnet 5 contained within a sleeve 2 that shields the magnet from plasma (see fig. 4 and

Art Unit: 1763

col. 3-line 53 to col. 5-line 16). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Dandl modified by Moslehi et al., Sekine et al. or Hershkowitz et al. so as to individually contain the permanent magnets in sleeves because in such a way this would prevent any contamination from sputtering of the permanent magnets.

Claims 10-11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dandl, U.S. Patent 5,370,765 in view of Moslehi et al., U.S. Patent 5,464,499, or Sekine et al., U.S. Patent 5,444,207, or Hershkowitz et al., U.S. Patent 5,032,205 as applied to claims 2, 4-7, 12, 26-32 above, and further in view of Grunenfelder, U.S. Patent 5,399,253 or Barankova et al., WO 99/27758.

Dandl, Moslehi et al. Sekine et al. and Hershkowitz et al. do not expressly disclose that the permanent magnets are moved to shift the magnetic field over time. Grunenfelder discloses an apparatus comprising permanent magnets 13,14 that are moved so that the magnetic field shifts over time (see abstract, figs. 3a-4c and col. 6-line 18 to col. 7-line 31). Barankova et al. discloses an apparatus comprising permanent magnets 1,2 that are moved so that the magnetic field shifts over time (see abstract, and figs. 1-9). Therefore, in view of these disclosures, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Dandl modified by Moslehi et al., Sekine et al. and Hershkowitz et al. as to move the permanent magnets in order to provide a rotatable magnetic field in the chamber.

Claims 2, 5-7, 10-12, 15 and 27-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dandl, U.S. Patent 5,370,765 in view of Tokyo Electron LTD, JP 7-130495 (English machine-translation included).

Dandl shows the invention substantially as claimed including a plasma processing apparatus 10' for processing a substrate 103 comprising: a process chamber comprising: a wall defining part of the process chamber; a device 101 for igniting and sustaining within the process chamber a plasma for said processing; and a plasma confinement arrangement, comprising a magnetic array (105, for example) having a plurality of permanent magnetic elements that are disposed within said process chamber, said plurality of magnetic elements being configured to produce a magnetic field, wherein said plurality of magnetic elements are within said plasma region, wherein the wall surrounds the magnetic elements and the plasma region so that plasma is able to form plasma deposition on the wall, and wherein the magnetic field produced by the magnetic elements reduces plasma deposition on the wall (see fig. 4A and its description, including col. 13-line 65 to col. 14-line 12).

Dandl is applied as above but fails to expressly disclose wherein each of said plurality of magnetic elements extend substantially from a first end of said process chamber to a chuck and are moved to shift the magnetic field over time. Tokyo Electron LTD discloses an apparatus comprising a plurality of permanent magnets 9 extending from a first end of the process chamber to a chuck in order

Art Unit: 1763

to generate a magnetic field within the processing chamber and moving the permanent magnets 9 around their own axis in order to provide a rotation magnetic field to equalize the plasma (see figs. 1-6 and, for example, paragraph 0003). Therefore, in view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Dandl so as to dispose the plurality of magnetic elements extending substantially from a first end of the process chamber to a chuck and as to move the permanent magnets because this is an alternative way to generate the magnetic field and in order to provide a rotatable magnetic field in the chamber so as to equalize the plasma, therefore, enhancing the plasma in the processing chamber.

With respect to claims 5-6 and 27, note that the permanent magnets of the apparatus of Dandl modified by Tokyo Electron LTD have physical axis which extend along the plasma region, have magnetic axis which are substantially perpendicular to the physical axis, and are disposed around and outside the periphery of the substrate.

Regarding claims 30 and 32, note that the chamber of the apparatus of Dandl is cylindrical (see, for example, col. 7-lines 62-65) and further comprises a dielectric window at the top of the substantially cylindrical shape.

Claims 9 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dandl, U.S. Patent 5,370,765 in view of Tokyo Electron LTD, JP 7-130495 (English machine-translation included) as applied to claims 2, 4-7,

Art Unit: 1763

10-12, 15 and 26-32 above, and further in view of Taira et al., U.S. Patent 6,153,977.

Dandl, and Tokyo Electron LTD are applied as above but fail to expressly disclose wherein said magnetic elements are individually contained in sleeves. Taira et al. discloses a permanent magnet 5 contained within a sleeve 2 that shields the magnet from plasma (see fig. 4 and col. 3-line 53 to col. 5-line 16). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Dandl modified by Tokyo Electron LTD so as to individually contain the permanent magnet in sleeves because in such a way this would prevent any contamination from sputtering of the permanent magnets.

Claims 2, 5-7, 12, 27-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkowitz et al., U.S. Patent 5,032,205.

Hershkowitz et al. shows the invention substantially as claimed including a plasma processing apparatus for processing a substrate comprising: a process chamber 90 comprising: a wall defining part of the process chamber; a device for igniting and sustaining within the process chamber a plasma for said processing; and a plasma confinement arrangement, comprising a magnetic array 14 having a plurality of permanent magnetic elements that are disposed within said process chamber, said plurality of magnetic elements being configured to produce a magnetic field, and wherein said plurality of magnetic elements are within said plasma region, wherein the wall surrounds the magnetic

elements and the plasma region so that plasma is able to form plasma deposition on the wall, and wherein the magnetic field produced by the magnetic elements reduces plasma deposition on the wall (see fig. 5 and its description).

Hershkowitz et al. fails to expressly disclose in the embodiment of fig. 5 wherein each of said plurality of magnetic elements extend substantially from a first end of said process chamber to a chuck. However, Hershkowitz et al. in the embodiment of fig. 3, discloses an apparatus which comprises a plurality of permanent magnets extending from a first end of said process chamber to a chuck for generating a magnetic field within the processing chamber (see, for example, fig. 3 and its description). Therefore, in view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of the embodiment of fig. 5 of Hershkowitz et al. so as to dispose the plurality of magnetic elements extending substantially from a first end of the process chamber to a chuck because this is an alternative way to generate the magnetic field and enhance the plasma in the processing chamber.

With respect to claims 5-6, note that the permanent magnets of the modified apparatus of Hershkowitz et al. have physical axis which extends along the plasma region and have magnetic axis which are substantially perpendicular to the physical axis.

Regarding claims 30, note that the chamber of the apparatus of Hershkowitz et al. is cylindrical (see, for example, col. 7-lines 62-65).

Claims 9 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkowitz et al., U.S. Patent 5,032,205 as applied to claims 2, 4-7, 12, 26-31 above, and further in view of Taira et al., U.S. Patent 6,153,977.

Hershkowitz et al. is applied as above but fails to expressly disclose wherein said magnetic elements are individually contained in sleeves. Taira et al. discloses a permanent magnet 5 contained within a sleeve 2 that shields the magnet from plasma (see fig. 4 and col. 3-line 53 to col. 5-line 16). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the modified apparatus of Hershkowitz et al. so as to individually contain the permanent magnets in sleeves because in such a way this would prevent any contamination from sputtering of the permanent magnets.

Claims 10-11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkowitz et al., U.S. Patent 5,032,205 as applied to claims 2, 4-7, 12, 26-31 above, and further in view of Grunenfelder, U.S. Patent 5,399,253 or Barankova et al., WO 99/27758.

Hershkowitz et al. does not expressly disclose that the permanent magnets are moved to shift the magnetic field over time. Grunenfelder discloses an apparatus comprising permanent magnets 13,14 that are moved so that the magnetic field shifts over time (see abstract, figs. 3a-4c and col. 6-line 18 to col. 7-line 31). Barankova et al. discloses an apparatus comprising permanent magnets 1,2 that are moved so that the magnetic field shifts over time (see

Art Unit: 1763

abstract, and figs. 1-9). Therefore, in view of these disclosures, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the modified apparatus of Hershkowitz et al. as to move the permanent magnets in order to provide a rotatable magnetic field in the chamber.

Response to Arguments

Applicant's arguments filed 6/29/04 have been fully considered but they are not persuasive.

In response to applicant's argument that if the magnets of Dandl are extended to the chuck, as suggested by the secondary references, such magnets would touch the substrate being processed, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

With respect to the argument that the magnetic field in the Dandl reference is vertical and the magnetic field of the secondary references is horizontal, it should be noted that the direction and magnitude of the magnetic field will depend on the desired characteristics of the plasma being generated inside the chamber, which is well within the knowledge and capability of one of ordinary skill in the art.

In response to applicant's argument nothing in the Hershkowitz reference suggest that the magnets of Fig. 3 may be used in the device of Fig. 5, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the Hershkowitz reference shows that the arrangement of the magnetic elements shown in Fig. 3 (the magnetic elements extending substantially from a first end of the process chamber to a chuck) is an alternative way to generate a magnetic field and enhance the plasma in a processing chamber.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

With respect to applicant argument regarding the rejections over the Taira et al. reference, the examiner kindly disagrees since the reference teaches that permanent magnets can be individually contained in a sleeve. Furthermore, there are not unexpected results shown for individually containing the permanent magnets within sleeves as opposed to containing a plurality of permanent

Art Unit: 1763

magnets within a sleeve. Note that attorney arguments cannot take the place of evidence in the record.

Regarding applicant's argument with respect to claim 32, it should be noted that the limitation of such claim is disclosed by the Dandl reference since the chamber of the apparatus is made of quartz.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

Art Unit: 1763

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 571-272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Luz L. Alejandro
Primary Examiner
Art Unit 1763

August 24, 2004